

# Wireless Crew Communication Feasibility Assessment

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HAT: 6.1.4, 6.3.4.1 TA: 6 Human Health, Life Support, and Habitation Systems TRL: start 4 / current 5

## ICA PROJECT OVERVIEW

Ongoing discussions with crew currently onboard the ISS as well as the crew debriefs from completed ISS missions indicate that issues associated with the lack of wireless crew communication results in increased crew task completion times and lower productivity, creates cable management issues, and increases crew frustration.

## INNOVATION

Since crew currently uses tablets (iPAD© & Surface Pro©) as well as a communication application (VSee) to conduct private conferences, the addition of a noise cancelling Bluetooth headset (Jawbone©) may allow the compilation of these technologies to be a solution for providing hands-free, wireless crew communications.

## OUTCOME / RESULTS

A Modified Rhyme Test (MRT), an American National Standards Institute (ANSI) statistical measure of speech intelligibility, was conducted in an acoustical reverb chamber under the maximum limit allowed for on-orbit noise (~60 dBA).

The MRT results indicated feasibility with an overall accuracy rate of 81% (90% accuracy while hearing words spoken by a male, and 73% accuracy when spoken by a female). Since this represents the worst/loudest scenario, MRT scores may improve at noise levels more representative of on-orbit spacecraft (e.g., ISS Airlock at 51.4 dBA, Cupola at 51.3 dBA).

## INFUSION FOR SPACE / EARTH

The application of this technology may be used to provide wireless crew communications on:

- Future Mars mission vehicles (i.e., ORION Multi-purpose Crew Vehicle (MPCV), Mars Ascent Vehicle (MAV), Habitable Airlock (HAL), Habitat modules, etc.)
- NASA Ground Analogs (HERA, CisLunar Habitat)
- ISS

## PICTURE OF ICA DEVELOPED PROTOTYPE



## PARTNERSHIPS / COLLABORATIONS

The Wireless Crew Communication investigation team for this ICA primarily consisted of personnel from the Usability Testing and Analysis Facility of the Habitability and Human Factors Branch, and the Human Interface Branch of the Avionics Systems Division at the Johnson Space Center (JSC). Additional technical support was provided by the Acoustics Noise and Control Lab of the JSC Acoustics Office.

The voice actor utilized for the presentation of the female voice stimuli during the conduct of the MRT was provided by YVOG Production ([www.yvogproduction.com](http://www.yvogproduction.com)).

## FUTURE WORK

Given the successful operational demonstration of the combined technologies as well as the resulting positive speech intelligibility scores, the effort completed during this ICA provides justification for further testing and future design iterations for a solution to the much needed and desired hands-free, wireless crew communication system. This may include, but is not limited to, the possible implementation of upcoming noise cancelling Bluetooth headsets or virtual reality display glasses (e.g., HoloLens©) as well as the potential development of an communication application which may provide a user interface for the crew which more closely resembles what is being utilized by ISS/MCC.

